HP ProLiant Essentials Performance Management Pack 4.2

Reference Matrix

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Contents

Overview

Abstract

This guide details the measurement parameters evaluated by HP ProLiant Essentials Performance Management Pack (PMP) 4.0 for the various components of a system configuration. A brief description of each parameter displayed in both the Status and Inventory view is provided.

Static analysis

The following configuration information is gathered by hardware discovery and analyzed by PMP to display the performance status of server components:

- Processors—For example, a mix of processors with different cache sizes
- Memory
- Network connections—For example, the ability to detect a NIC running at reduced speed or in half duplex mode
- Storage—For example:
  - A fast physical disk drive plugged into an enclosure that cannot support the maximum I/O capabilities of the drive
  - A slow physical drive plugged into a fast enclosure
  - A RAID consisting of a mix of drive speeds
  - A RAID consisting of a mix of drive capacities
- Host buses—For example:
  - Bus overloading
  - Too many I/O resources plugged into the same bus on a multi-bus server

ATA disk array

The following information is provided for an ATA disk array.

ATA Disk Array Status

- Reads/Sec—The number of reads from this ATA disk array each second
- Writes/Sec—The number of writes to this ATA disk array each second
- Read MBytes/Sec—The average number of megabytes read from the ATA disk array each second
- Write MBytes/Sec—The average number of megabytes written to the ATA disk array each second
- Millisec/Read—The average time for each read to complete
- Millisec/Write—The average time for each write to complete
- Queue Length—The average number of concurrent requests between the server and this ATA disk array, including transfers currently being serviced and transfers waiting for service, regardless of where the request is waiting (disk or IDE controller)

ATA disk array performance is not evaluated because the performance of an array is determined by the performance of the disks in the array.

ATA Disk Array Inventory

- Array Configuration
  - Displays the total capacity of the disk array
  - Displays where the disk array is defined (which IDE controller)
  - Displays the RAID level and striping factor (if applicable) for the array
- Hard Drives—Lists the ATA disks that constitute the disk array
- Spare Drives—Lists the ATA disks that are designated as spares

ATA disk

The following information is provided for an ATA disk.

ATA Disk Status

- Reads/Sec—The number of reads from this ATA disk each second
- Writes/Sec—The number of writes to this ATA disk each second
- Read MBytes/Sec—The average number of megabytes read from the ATA disk each second
- Write MBytes/Sec—The average number of megabytes written to the ATA disk each second
- Millisec/Read—The average time for each read to complete
- Millisec/Write—The average time for each write to complete
- Queue Length—The average number of concurrent requests between the server and this ATA disk (Queue Length is the primary indicator of ATA disk performance, whether the disk is part of an array)

ATA Disk Inventory

- Disk Information—Displays a description of the drive, including the hard drive model number
- Configuration Information
  - Provides a summary of the drive configuration
  - Displays the name of the IDE controller to which it is attached
  - Indicates to which disk array the disk belongs (if applicable)

Drive array

The following information is provided for a drive array.

Drive Array Status

- Reads/Sec—The number of reads from each drive in the drive array each second
- Writes/Sec—The number of writes to each drive in the drive array each second
- Read MBytes/Sec—The average number of megabytes read from each drive in the drive array each second
- Write MBytes/Sec—The average number of megabytes written to each drive in the drive array each second
- Millisec/Read—The average time for each read to complete
- Millisec/Write—The average time for each write to complete
- Queue Length—The average number of concurrent requests between the server and each drive in the drive array, including transfers currently being serviced and transfers waiting for service, regardless of where the request is waiting (drive or controller)

Drive Array Inventory

- Array Configuration—Displays on which Smart controller the drive array is defined and the number of array logical drives implemented on the array
- Hard Drives—Lists the SCSI drives constituting the disk array
- Spare Drives—Lists the SCSI drives designated as spares

External storage enclosure

The following information is provided for an external storage enclosure.

External Storage Enclosure Status

- Transfers/Sec—The average number of transfers (reads and writes) on this external storage enclosure each second
- MBytes/Sec—The average number of megabytes transferred on this external storage enclosure each second
- Millisec/Transfer—The average time to complete a transfer to and from the selected external storage enclosure
- Enclosure Queue—The average number of transfer requests (reads and writes) waiting to be serviced by the external channel storage enclosure

PMP does not evaluate the performance of external storage enclosures

External Storage Enclosure Inventory

- Enclosure Configuration—Displays the type or model, name, and serial number of the external storage enclosure.
- Controller—Displays the name and model of the enclosure and whether it is operating with redundant controllers. If a redundant controller is configured, then both standby and active controllers are listed (if redundancy is not configured, only active controllers are listed).
- Host Bus Adapters (HBAs)—Lists the HBAs used to attach the enclosure to the server.
- Windows/Linux Physical Disks—Lists the logical volumes defined in the storage enclosure.

Fibre Channel host bus adapter

The following information is provided for a Fibre Channel HBA.

Fibre Channel Host Bus Adapter Status

- Transfers/Sec—The average number of transfers on the selected HBA each second
- MBytes/Sec—The average number of megabytes transferred on the selected HBA each second
- Millisec/Transfer—The average time to complete a data transfer between the server and the storage attached to the selected HBA
- Queue Length—The average number of concurrent requests between the server and this HBA, including transfers currently being serviced and transfers waiting for service, regardless of where the request is waiting
- Port Utilization %—The average utilization of the Fibre Channel port on this adapter.

Performance is determined by comparing the MBytes/Sec with the theoretical throughput (1 or 2 GB/s) of the HBA.

Fibre Channel Host Bus Adapter Inventory

- Host Bus Adapter Configuration—Displays the name of the HBA and the supported and negotiated PCI protocol (bus speed) of the HBA
- Fibre Channel Enclosures—Displays all enclosures assigned to the HBA, the names of the enclosures, and the enclosure models
- Windows/Linux Physical Disks—Displays all physical disks traced from the server to the logical drives on the accessible enclosures

Host buses

The following information is provided for host buses.

Host Buses Status

- Host Bus MBytes/Sec—The average number of megabytes transferred over the host buses each second

Host Buses Inventory

- Bus Configuration—Displays a summary of each PCI or PCI-X bus on the server with the PCI/PCI-X slots and the I/O expansion boards installed in each slot

IDE channel

The following information is provided for an IDE channel.

IDE Channel Status

- MBytes/Sec—The average number of megabytes transferred on this IDE channel each second (the sum of the MBytes/Sec for all ATA disks on this channel)
- Transfers/Sec—The average number of transfers on this IDE channel each second (the sum of the Transfers/Sec for all ATA disks on this channel)
- Channel Queue—The average number of transfer requests (reads and writes) waiting to be serviced by ATA disks on the IDE channel

IDE Channel Inventory

- Channel Configuration
  - Identifies the IDE controller to which this IDE channel is connected
  - The number of ATA disks attached to the channel

IDE controller

The following information is provided for an IDE controller.

IDE Controller Status

- Transfers/Sec—The number of requests between the server and this IDE controller each second
- MBytes/Sec—The sum of all megabytes transferred (read and written) between the server and this IDE controller each second
- Millisec/Transfer—The average time for each request to complete
- Queue Length—The average number of concurrent requests between the server and this IDE controller, including transfers currently being serviced and transfers waiting for service, regardless of where the request is waiting (disk or controller)

IDE controller status is determined by the performance status of the ATA disks attached to the controller and the IDE channels connecting the ATA disks to the controller.

IDE Controller Inventory

- Controller Configuration
  - The controller identification, including controller model and PCI slot (if applicable)
  - Number of disk arrays on the controller (if applicable)
  - Number of ATA disks attached to the controller
- Windows/Linux Physical Disks—Lists each Microsoft® Windows® and Linux physical disk defined on this IDE controller and whether the physical disk is defined on a single ATA disk or an array of ATA disks

Logical drive

The following information is provided for a logical drive.

Logical Drive Status

- Reads/Sec—The number of reads from this logical drive each second
- Writes/Sec—The number of writes to this logical drive each second
- Read MBytes/Sec—The number of megabytes read from the logical drive each second
- Write MBytes/Sec—The number of megabytes written to the logical drive each second
- Millisec/Read—The average time for each read to complete
- Millisec/Write—The average time for each write to complete
- Queue Length—The average number of concurrent requests between the server and this logical drive, including transfers currently being serviced and transfers waiting for service, regardless of where the request is waiting (disk or controller)

Logical Drive Inventory

- Logical Drive Configuration
  - The controller on which the logical drive is defined
  - The array label (such as A, B, or C) as shown by the Array Configuration Utility (ACU)
  - The logical drive number as assigned by the ACU and the physical disk mapping
  - Logical drive size in megabytes
  - The RAID level for this logical drive
  - The logical drive striping factor
  - Whether caching is enabled for this logical drive

Memory

The following information is provided for memory.

Memory Status

- Available MBytes—The amount of memory that is not currently allocated to any process or is unused. A low Available MBytes value can indicate memory allocation bottlenecks.
- Page Reads/Sec—The number of times the disk was read to retrieve pages of virtual memory necessary to resolve page faults each second. Multiple pages can be read during a single disk read operation.
- Pages Input/Sec—The number of pages read from the disk to resolve memory references to pages that were not in memory at the time of the reference. This counter includes paging traffic on behalf of the system cache to access file data for applications. It is important to observe this counter if you are concerned about excessive memory usage, or thrashing, and the excessive paging that can result.
- Page Faults/Sec—The average number of page faults each second. A page fault occurs when a process refers to a virtual memory page that is not in its working set in main memory. A page fault does not cause the page to be fetched from disk if that page is on the standby list and is already in main memory or if it is in use by another process with which the page is shared. There are two types of page faults:
  - Hard Page Fault—The most expensive in terms of system resource usage, occurring when a missing page must be retrieved from the disk
  - Soft Page Fault—Generally not considered a source of memory bottlenecks, occurring when the missing page is not in the current working set but is located elsewhere in memory and easily brought into the working set
- Hard Page Faults %—The ratio of page faults per second to pages input per second. This value is a primary indication of memory bottlenecks.

Memory performance is determined primarily by the rate at which memory is swapped out to disk. Page Reads/Sec is the primary factor in determining memory performance issues, but the Hard Page Faults % and Available MBytes are also considered.

Memory Inventory

- System Memory
  - Displays the physical memory installed in the server
  - Displays the amount of memory that can be addressed by the operating system
  - Displays any server-specific memory technology or configurations
- Memory Board—Describes the configuration of the memory boards and lists the number of DIMMs configured in each particular DIMM socket and any empty sockets

Network adapter

The following information is provided for a network adapter.

Network Adapter Status

- MBits TX/Sec—The average number of megabits transmitted from the selected adapter each second
- MBits RX/Sec—The average number of megabits received by the selected adapter each second
- MBytes/Sec—The average number of megabytes transferred (transmitted or received) over the network adapter each second

Network adapter performance is determined by the performance of the NIC ports on the adapter.

Network Adapter Inventory

- NIC Configuration
  - Displays the name and location of the network adapter
  - Displays the supported and negotiated PCI protocol (bus speed) of the network adapter
  - Lists the number of ports on the NIC adapter, including any upgrade modules installed on the network adapter
- NIC Ports—Displays all IP addresses assigned to the network ports
- Network Teams—The state of all the ports on all network adapters

Network connections

The following information is provided for network connections.

Network Connections Status

- Network MBytes/Sec—The average number of megabytes transferred (transmitted or received) over the network subsystem each second
- MBits TX/Sec—The average number of megabits transmitted over the network each second
- MBits RX/Sec—The average number of megabits received over the network each second

Network connection performance is determined by the performance of the network adapters.

Network Connection Inventory

- Network Connections Configuration—Displays the number of adapters and ports installed and available on the server, including any that are disabled
- IP Addresses—Displays all IP addresses assigned to the ports

Network port

The following information is provided for a network port.

Network Port Status

- MBytes/Sec—The average number of megabytes transferred (transmitted or received) over the NIC port each second.
- MBits TX/Sec—The average number of megabits transmitted from the selected NIC port each second.
- MBits RX/Sec—The average number of megabits received by the selected NIC port each second.
- TX Utilization %—The percentage of data that is transmitted from the selected NIC port. This value is calculated from the TX MBits/Sec and the operating speed of the NIC port.
- RX Utilization %—The percentage of data that is received from the selected NIC port. This value is calculated from the RX MBits/Sec and the operating speed of the NIC port.
- Port Utilization %—The percentage of data that is transferred (transmitted over the NIC port). If the port is running in full duplex mode, Port Utilization % is the higher of TX Utilization % and RX Utilization %. If the port is running in half duplex mode, Port Utilization % is the sum of TX Utilization % and RX Utilization %.

Network Port Inventory

- Port Configuration
  - Displays the name of the NIC adapter
  - Displays the name of the port (on the base board or upgrade module)
  - Displays the media access control (MAC) address of the NIC port
  - Displays the IP address of the NIC port
  - Displays the maximum speed (in MB/s) of the NIC port
  - Provides the NIC teaming configuration if the server is configured with NIC teaming

Network storage array

The following information is provided for a network storage array.

Network Storage Array Status

- Server Transfers/Sec—The average number of transfer requests (read and written) between the monitored servers and the array each second
- Server MBytes/Sec—The average number of megabytes transferred (read and written) between the monitored servers and this array each second
- Server Millisec/Transfer—The average time for each request between the monitored servers and the array to complete
- Server Queue Length—The average number of transfer requests (read and written) from the monitored servers that are waiting to be serviced by this array
- Array MBytes/Sec—The average number of megabytes transferred (read and written) to all the disks in the array each second
- Disk Queue Length—The average number of transfer requests (read and written) waiting to be serviced by each disk in the array

Network Storage Array Inventory

- Array Configuration—Displays the number of logical drives implemented on the array
- Hard Drives—Lists the drives that constitute the array

Network storage controller

The following information is provided for a network storage controller.

Network Storage Controller Status

- Transfer/Sec—The average number of transfers (reads and writes) on this network storage controller each second
- MBytes/Sec—The average number of megabytes transferred on this network storage controller each second
- Millisec/Transfer—The average time to complete a transfer to and from the selected network storage controller
- Queue Length—The average number of transfer requests (reads and writes) waiting to be serviced by the network storage controller
- Port Utilization%—The average utilization of the Fibre Channel port on this controller

Network Storage Controller Inventory

- Controller Configuration
  - The controller identification, including controller model
  - The supported and negotiated PCI protocols (bus speed)

Network storage enclosure

The following information is provided for a network storage enclosure.

Network Storage Enclosure Status

- Transfers/Sec—The average number of transfers (reads and writes) on this network storage enclosure each second
- MBytes/Sec—The average number of megabytes transferred on this network storage enclosure each second
- Millisec/Transfer—The average time to complete a transfer to and from the selected network storage enclosure
- Queue Length—The average number of transfer requests (reads and writes) waiting to be serviced by the network storage enclosure

Network Storage Enclosure Inventory

- Enclosure Configuration—Displays the type or model, name, and serial number of the network storage enclosure.
- Controllers—Displays the name and model of the enclosure and whether it is operating with redundant controllers. If a redundant controller is configured, then both standby and active controllers are listed (if redundancy is not configured, only active controllers are listed).
- Detected Servers—Displays a list of servers sharing the enclosure.

Network storage logical drives

The following information is provided for logical drives located in the network storage.

Network Share Status

- Reads/Sec—The average number of reads from the selected logical drive each second
- Writes/Sec—The average number of writes to the selected logical drive each second
- Read MBytes/Sec—The average number of megabytes read from the selected logical drive each second
- Write MBytes/Sec—The average number of megabytes written to the selected logical drive each second
- Millisec/Read—The average time required to complete a read operation
- Millisec/Write—The average time required to complete a write operation
- Queue Length—The average number of transfer requests (reads and writes) that are waiting to be serviced by the logical drive

Network Share Inventory

- Logical Drive Configuration
  - Displays the total capacity of the drive
  - Displays the network storage enclosure in which the selected logical drive is located
  - Displays the RAID level for this logical drive

PCI bus

The following information is provided for a PCI bus.

PCI Bus Status

- MBytes/Sec—The average number of megabytes transferred on the selected PCI bus each second.
- PCI Utilization %—The PCI utilization for the selected PCI bus. A 32-bit PCI and 64-bit PCI can operate simultaneously on the same PCI bus. The utilization is primarily dependent on the MBytes/Sec rate and the negotiated PCI bus protocol:
  - 32-bit PCI—Operates at 33 MHz, resulting in a maximum throughput of 132 MB/s
  - 64-bit PCI—Operates at 33 MHz, resulting in a maximum throughput of 264 MB/s
  - 64-bit/50-MHz PCI-X—Provides a maximum throughput of 400 MB/s
  - 64-bit/66-MHz PCI or PCI-X—Provides a maximum throughput of 528 MB/s
  - 64-bit/100-MHz PCI-X—Provides a maximum throughput of 800 MB/s
  - 64-bit/133-MHz PCI-X—Provides a maximum throughput of 1064 MB/s
  - PCI Express X1—Provides a maximum throughput of 500 MB/s
  - PCI Express X2—Provides a maximum throughput of 1000 MB/s
  - PCI Express X4—Provides a maximum throughput of 2 GB/s
  - PCI Express X8—Provides a maximum throughput of 4 GB/s
  - PCI Express X12—Provides a maximum throughput of 6 GB/s
  - PCI Express X16—Provides a maximum throughput of 8 GB/s

PCI bus performance is evaluated using the Bus Utilization %.

NOTE: PMP does not accurately report the negotiated PCI bus protocol when unknown PCI devices with slower transfer rates than the controller are configured on the same bus.

PCI Bus Inventory

- PCI Support—Displays the supported and negotiated PCI protocol (bus and speed)
- PCI Devices—Lists the PCI bus slots and any I/O expansion boards installed in the slots

Processors

The following information is provided for processors.

Processors Status

- Average Processor Utilization %—The average percentage of time that all the processors on the system are busy executing non-idle threads. On a multiprocessor system, if all processors are always busy, the metric reads 100%; if all processors are 50% busy, the metric reads 50%; if one-fourth of the processors are busy, the metric reads 25%. Average Processor Busy % can be viewed as the fraction of the time spent doing useful work.

  Each processor is assigned an idle thread in the idle process consuming unproductive processor cycles not used by another thread. Some processors might be more heavily loaded than other processors. In this case, the total processor time percentage is the average of the loads on each processor.
- Busiest Processor Utilization %—The average utilization of the logical processor with the highest utilization. This value is equal to the Average Processor Utilization % if the server is using one processor core.
- Processor Busy %—The percentage of time that the processor is executing a non-idle thread.
- Context Switches/Sec—The number of thread context switches at which all processors on the server are switched from one thread to another each second. Context switches occur when a running thread voluntarily relinquishes the processor, is preempted by a higher-priority ready thread, or switches between user mode and privileged (kernel) mode to use a subsystem service.
- Interrupts/Sec—The average number of hardware interrupts the processor is receiving and servicing each second.

Average Processor Utilization % and Highest Processor Utilization % are used to determine processor performance.

Processors Inventory

- Processor Support—Lists the number of processors supported by the server
- Processors—Displays the number of processors installed on the server and a summary of the processors (type, speed, and cache size)

SCSI adapter

The following information is provided for a SCSI adapter.

SCSI Adapter Status

- Transfers/Sec—The number of requests between the server and this SCSI adapter each second
- MBytes/Sec—The average number of megabytes transferred (read and written) between the server and this SCSI adapter each second
- Millisec/Transfer—The average time for each request to complete
- Queue Length—The average number of concurrent requests between the server and this SCSI adapter, including transfers currently being serviced and transfers waiting for service, regardless of where the request is waiting (drive or adapter)

SCSI adapter performance is based on the performance of the SCSI disks attached to the adapter and the SCSI buses used to attach the disks to the adapter.

SCSI Adapter Inventory

- Controller Configuration
  - Identifies the supported and negotiated PCI protocol (bus speed) used by the SCSI adapter
  - Provides the number of SCSI drives configured on the adapter
  - Provides the number of SCSI ports used
- Windows/Linux Physical Disks—Lists the physical disk drives and identifies each drive SCSI ID, drive letter, and associated SCSI adapter

SCSI storage enclosure

The following information is provided for a SCSI storage enclosure.

SCSI Storage Enclosure Status

- Transfers/Sec—The average number of transfers on this SCSI bus each second (the sum of the Disk Transfers/Sec for all hard drives on this bus).
- MBytes/Sec—The average number of megabytes transferred on this SCSI bus each second (the sum of the Disk MBytes/Sec for all SCSI drives on this bus).
- SCSI Utilization %—The average SCSI utilization for this SCSI bus, which is primarily dependent on the MBytes/Sec, and the SCSI protocol negotiated between the controller and each drive on the bus. The negotiated SCSI protocol is reported in the hard drive inventory. The valid SCSI protocols include:
  - SCSI-1—5 MB/s with 8-bit transfers at 5 MHz (5,000,000 bytes/s)
  - Fast SCSI-2—10 MB/s with 8-bit transfers at 10 MHz (10,000,000 bytes/s)
  - Fast-Wide SCSI-2—20 MB/s with 16-bit transfers at 10 MHz
  - Ultra SCSI-3—20 MB/s with 8-bit transfers at 20 MHz
  - Wide-Ultra SCSI-3—40 MB/s with 16-bit transfers at 20 MHz
  - Wide Ultra2 SCSI—80 MB/s with 16-bit transfers at 40 MHz
  - Wide Ultra3 SCSI—160 MB/s with 16-bit transfers at 80 MHz
  - Ultra320 SCSI—320 MB/s with 16-bit transfers at 160 MHz

SCSI storage enclosure performance is determined by the SCSI Utilization %.

SCSI Storage Enclosure Inventory

- Enclosure Configuration
  - The type or model of the storage enclosure
  - Which SCSI protocol is supported by the storage enclosure
  - The number of drive bays provided by the storage enclosure
  - The number of SCSI drives installed in the storage enclosure
  - The SCSI adapter attached to the storage enclosure and the port on the adapter

SCSI drive

The following information is provided for a SCSI drive.

SCSI Drive Status

- Disk Reads/Sec—The average number of reads from the selected SCSI drive each second
- Disk Writes/Sec—The average number of writes to the selected SCSI drive each second
- Disk Read MBytes/Sec—The average number of megabytes read from the selected SCSI drive each second
- Disk Write MBytes/Sec—The average number of megabytes written to the selected SCSI drive each second
- Disk Millisec/Read—The average time required to complete a read
- Disk Millisec/Write—The average time required to complete a write
- Disk Queue Length—The average number of transfer requests (reads and writes) waiting to be serviced by the SCSI drive, including transfers currently being serviced and transfers waiting for service, regardless of where the request is waiting (drive or controller)

PMP uses a set of algorithms to determine SCSI drive status. In general, the Disk Queue Length is a primary parameter. When the value of the Disk Queue Length exceeds an acceptable value, the Disk Reads/Sec and Writes/Sec are examined to determine whether read or write operations are requiring most of the drive throughput. When combined with Disk Millisec/Read or Write, PMP can determine if the number of requests for the drive is exceeding the capabilities of the drive.

SCSI Drive Inventory

- Drive Information
  - Displays a description of the drive, including the size
  - Displays the hard drive model number
  - Displays the exact size of the drive as seen by the operating system
- Configuration Information
  - Provides a summary of the drive configuration
  - Displays the name of the Smart Array controller to which it is attached
  - Displays the location of the hard drive in its enclosure
  - Displays the array in which the drive is configured
  - Provides the SCSI protocol negotiated for transfers between this drive and the disk controller

Server Metrics

The following information is provided for server metrics.

Server Status

- Average Processor Utilization %—The percentage of time that the processor is executing a non-idle thread, averaged for the number of processors in the server.
- Available MBytes—The amount of memory not currently allocated to any process (unused). A low Available MBytes value can indicate memory allocation bottlenecks.
- Page Faults/Sec—The number of faulted pages handled by the processor each second.
- Network MBytes/Sec—The sum of megabytes transferred (transmitted and received) over the subsystem each second.
- Storage MBytes/Sec—The sum of megabytes transferred (read and written) over the storage subsystem each second.
- Host Bus MBytes/Sec—The sum of megabytes transferred over the host buses each second.

Server Inventory

- Server model
  - Processor quantity and description
  - Amount of memory
  - Network adapters and ports
  - Storage controllers/SCSI adapters
  - Host buses
- Operating system
  - Server operating system and version information
  - Summary of the file systems defined on the operating system
  - Number of processors in use
  - Windows and Linux physical disks

Smart Array controller

The following information is provided for a Smart Array controller.

Smart Array Controller Status

- Transfers/Sec—The number of requests between the server and this IDE Smart Array controller each second
- MBytes/Sec—The sum of all megabytes transferred (read and written) between the server and this Smart Array controller each second
- Millisec/Transfer—The average time for each request to complete
- Queue Length—The average number of concurrent requests between the server and this Smart Array controller, including transfers currently being serviced and transfers waiting for service, regardless of where the request is waiting (drive or controller)

Smart Array controller performance is based on the performance of the SCSI disks attached to the controller and the SCSI buses used to attach the drives to the controller.

Smart Array Controller Inventory

- Controller Configuration
  - The controller identification, including controller model and PCI slot (if applicable)
  - The supported and negotiated PCI protocols (bus speed)
  - The controller cache configuration
  - Number of hard disks attached to the controller
  - Number of SCSI ports currently in use on the controller
  - Number of arrays on the controller
  - Number of array logical drives defined on the controller
- Windows/Linux Physical Disks—Lists the physical disk drives and identifies each drive SCSI ID, drive letter, and associated Smart Array controller

Smart Array SCSI drive

The following information is provided for a Smart Array SCSI drive.

Smart Array SCSI Drive Status

- Disk Reads/Sec—The number of reads from the drive each second
- Disk Writes/Sec—The number of writes to the drive each second
- Disk Read MBytes/Sec—The number of megabytes read from the drive each second
- Disk Write MBytes/Sec—The number of megabytes written to the drive each second
- Disk Millisec/Read—The average time for each read to complete
- Disk Millisec/Write—The average time for each write to complete
- Disk Queue Length—The average number of concurrent requests between the server and the drive

SCSI drive performance is based on Disk Queue Length.

Smart SCSI Drive Inventory

- Drive Information
  - Displays a description of the drive, including the size
  - Displays the hard drive model number
  - Displays the exact size of the drive as seen by the operating system
- Configuration Information
  - Provides a summary of the drive configuration
  - Displays the name of the Smart Array controller to which it is attached
  - Displays the location of the hard drive in its enclosure
  - Displays the array in which the drive is configured
  - Provides the SCSI protocol negotiated for transfers between this drive and the disk controller

SATA Drives

The following information is provided for a SATA drive.

SATA Drive Status

- Disk Read/Sec – The average number of reads from the selected SATA drive each second.
- Disk Write/Sec – The average number of writes to the selected SATA drive each second.
- Disk Read Mbytes/Sec – The average number of Megabytes of data read from the selected SATA drive each second.
- Disk Write Mbytes/Sec – The average number of Megabytes of data written to the selected SATA drive each second.
- Disk Millisec/Read – The average time required to complete a read operation
- Disk Millisec/Write – The average time required to complete a write operation.
- Disk Queue Length – The average number of transfer requests (reads and writes) waiting to be serviced by the SATA drive, including transfers currently being serviced and transfers waiting for service, regardless of where the request is waiting (drive or controller).

  PMP uses a set of algorithms to determine the SATA drive status. In general, the Disk Queue Length is a primary parameter. When the value of the Disk Queue Length exceeds the acceptable value, the Disk Reads/Sec and Writes/Sec are examined to determine whether read or write operations require most of the drive throughput. When combined with Disk Millisec/Read or Write, PMP can determine if the number of requests for the drive will exceed the capabilities of the drive.

SATA Drive Inventory

- Drive Information
  - Displays description of the drive, including size
  - Displays the hard drive model number
  - Displays the exact size of the drive as seen by the operating system
- Configuration Information
  - Provides a summary of the drive configuration
  - Displays the name of the Smart Array controller to which it is attached
  - Displays the location of the hard drive in its enclosure
  - Displays the array in which the drive is configured
  - Provides the SATA protocol negotiated for transfers between this drive and the disk controller

SAS Drives

The following information is provided for a SAS Drive.

SAS Drive Status

- Disk Read/Sec – The average number of reads from the selected SAS drive each second.
- Disk Write/Sec – The average number of writes to the selected SAS drive each second.
- Disk Read Mbytes/Sec – The average number of Megabytes of data read from the selected SAS drive each second.
- Disk Write Mbytes/Sec – The average number of Megabytes of data written to the selected SAS drive each second.
- Disk Millisecond/Read – The average time required to complete a read operation
- Disk Millisecond/Write – The average time required to complete a write operation.
- Disk Queue Length – The average number of transfer requests (reads and writes) waiting to be serviced by the SAS drive, including transfers currently being serviced and transfers waiting for service, regardless of where the request is waiting (drive or controller).

  PMP uses a set of algorithms to determine the SAS drive status. In general, the Disk Queue Length is a primary parameter. When the value of the Disk Queue Length exceeds the acceptable value, the Disk Reads/Sec and Writes/Sec are examined to determine whether read or write operations require most of the drive throughput. When combined with Disk Millisecond/Read or Write, PMP can determine if the number of requests for the drive will exceed the capabilities of the drive.

SAS Drive Inventory

- Drive Information
  - Displays description of the drive, including size
  - Displays the hard drive model number
  - Displays the exact size of the drive as seen by the operating system
- Configuration Information
  - Provides a summary of the drive configuration
  - Displays the name of the Smart Array controller to which it is attached
  - Displays the location of the hard drive in its enclosure
  - Displays the array in which the drive is configured
  - Provides the SAS protocol negotiated for transfers between this drive and the disk controller

Storage components

Storage components differ depending on the server environment. PMP is designed to monitor a variety of storage components, including:

- Storage enclosures
- Fibre Channel HBAs
- SCSI arrays and logical and physical disk drives
- Smart arrays

Storage Status

- Storage Transfers/Sec—The number of PCI bus transfers to and from storage each second
- Storage MBytes/Sec—The average number of megabytes transferred (read and written) on the storage each second

Storage Inventory

- Windows/Linux Logical Disks—Lists all of the logical disks in the storage subsystem and identifies their associated drive letter, file system, disk drive size (in MB), and percentage of space used
- Windows/Linux Physical Disks—Lists all of the physical disks in the storage subsystem and identifies their associated SCSI ID, drive letter, and array controller